CLAIMS

1. Capping device (1) for a neck (70) of a receptacle (7) with an axis of symmetry (71), typically a bottle, comprising a threaded upper portion (700) with height Hf provided with at least one thread with N turns and a lower portion or crimping ring (701), using a screw sealing cap (8) provided with a head (82) and a metallic crimpable skirt (80), the said device (1) comprising a capping head (2) capable of rotating at a rotation speed Ω using a rotation means (13), about an axis of rotation (20) common with the said axis of symmetry (71), and with axial displacement so as to move the said capping head (2) closer to the said neck (70) typically fixed in the axial direction, during the said capping operation, characterised in that:

a) the said capping head (2) is provided with a means of screwing the said cap (8) to the said threaded upper portion (700) of the said neck (70), and a means of crimping the said skirt (80) under the said crimping ring (701), the said axial displacement comprising a first axial displacement of the said capping head (2) activating the said screwing means and a second axial displacement of the said capping head (2) activating the said crimping means,

b) the said screwing means rotates the said cap (8) with respect to the said neck (70), during the said first displacement, the said screwing means comprising a means applying a force F0 on the said head (82) of the

said cap (8) varying typically from 20 N to 150 N, during all or part of the said screwing step,

so as to have a screwing step and a crimping step forming the said capping operation, in a single axial displacement of the said capping head (2).

2. Device according to claim 1 in which the said screwing means rotates the said cap (8) with a rotation speed typically close to the said rotation speed Ω of the said capping head (2).

3. Device according to claim 2, in which the said screwing means comprises a spring R0 (60) applying the said force F0 on the said head (82) of the said cap (8).

4. Device according to any one of claims 1 to 3, in which the said crimping means includes at least two arms or lifting beams (40), each arm (40) carrying a crimping roller (41) at its lower end, articulated so that it can be brought closer to the said neck (70) during the said crimping step and moved away from the said neck (70) during the said screwing step.

5. Device according to any one of claims 1 to 4 in which the said capping head (2) includes a means, typically a spring R2 (42) for applying a force F2 on the said head (82) of the said cap (8), typically varying from 500 N to 1500 N after the said screwing step and during all or part of the said crimping step.

6. Device according to claim 5, in which the said means for applying the said force F2 is typically activated before the said rollers (41) are applied in contact with the said skirt in order to crimp the said skirt (80), so as to axially compress the said cap (8) in contact with the said neck (70) and its sealing ring, particularly when the said cap (8) comprises a compressible seal (81) to be compressed before the crimping step in order to seal the said cap (8) on the said neck (70).

7. Device according to any one of claims 4 to 6 in which the said capping head (2) comprises:

a) a support C3 (3), typically cylindrical, solidarised to a fixed frame (10), capable of turning about the said axis of rotation (20) with the said rotation speed Ω typically predetermined and possibly constant, and moving in the axial direction with respect to the said neck (70) with an axial displacement D3,

b) a coaxial tubular body C2 (4) internal to the said support C3 (3) and coaxial with it, but capable of moving axially with respect to the said support C3 (3) with an axial displacement D2, the said support C3 (3) comprising a lower stop (30) to limit the axial displacement of the said tubular body C2 (4) and applying a force F2

on the said tubular body C2 (4), typically using a spring R2 (42),

c) a central body C1 (5), coaxial with the said tubular body C2 (4), typically hollow, solidarised to the said tubular body C2 (4) for the said displacement D2 typically by means of a set of bearings, typically needle bearings (45), the said tubular body C2 (4) forming a hub for the said central body C1 (5) acting as an axle,

d) a means for partial coupling of the said tubular body C2 (4) and the said central body C1 (5) in rotation, rotation of the said tubular body C2 (4) only causing a rotation of the said central body C1 (5) during the said screwing step, rotation of the said central body C1 (5) possibly being interrupted by the development of an opposing torque C at the end of screwing,

e) the said central body C1 (5) comprises a bearing part C0 (6) that will cause rotation of the said cap (8) and move axially with respect to the said central body C1 (5) with a displacement D0 typically corresponding to the height of the said threaded portion (700) of the said cap (8), an upper stop (51) for the said bearing part (6) and a spring R0 (60) applying a force F0 on the said bearing part C0 (6) so as to provide coupling of the said capping head (2) through the said bearing part C0 (6) and the said cap (8) in rotation, and to form the said screwing means,

f) the said arms or lifting beams (40) of the said crimping means are axially fixed to the said tubular body C2 (4) and can be rotated due to a secondary rotation axis (44) typically fixed to the said tubular body C2(4).

8. Device according to claim 7 in which the said crimping means includes a cam (32) axially fixed to the said support C3 (3), each of the said typically rigid arms (40) comprising an upper part (400) typically provided with a caster or a wheel or a sliding pad (401), and a roller support arm (402) supporting the said roller (41), such that the said second displacement causes a temporary cooperation of the said cam (32) and the said wheel or pad (401), bringing the said roller (41) closer to the said neck (70) for the said crimping.

9. Device according to either claim 7 or 8 in which the said support C3 (3) of the said capping head (2) is solidarised to an arm (12), typically horizontal, and is free in rotation with respect to the said arm (12), the said support C3 (3) and the said arm (12) respectively forming an axle / hub assembly, the said arm (12) possibly acting as a support for a motor forming the said rotation means (13) capable of driving the said support C3 (3) in rotation.

10. Device according to claim 9 in which the said arm (12) and the said fixed frame (10) cooperate,

typically using a vertical column (14) so as to assure the said axial displacement D3 of the support C3 (3) by translation of the said arm (12) in a vertical plane, typically by means of an auxiliary motor (11) acting as an axial displacement means.

11. Device according to claim 9 in which the said arm (12) is placed onboard a rotary turret and forms part of a set of n capping heads (2), where n typically varies from 2 to 12, the supports C3 (3) being engaged to a central gearwheel to rotate the said supports C3.

12. Device according to any one of claims 7 to 11 in which the said partial rotational coupling means of the said tubular body C2 (4) and the said central body C1 (5) is a magnetic or electromagnetic coupling, typically by means of facing magnets (43, 50) supported by the said tubular body C2 (4) and the said central body C1 (5).

13. Device according to any one of claims 7 to 12 in which, at the end of the screwing step, the said bearing part C0 (6) can be brought into contact with the said upper stop (51) so that the said central body C1 (5) and the said tubular body C2 (4) can transmit the said force F2 to the head (82) of the said cap (8).

14. Device according to any one of claims 1 to 13 in which the rotation speed Ω and displacement speed V of the said capping head (2) during the said first

displacement are slaved so as to satisfy the relation $V = Hf.\Omega/N$ so as to synchronise rotation of the said cap (8) and lowering it onto the neck (70) during the said screwing step, typical values of Hf, Ω and N being between 5 mm and 20 mm for Hf, between 150 rpm and 500 rpm for Ω, and between 10 and 25 turns for N.

15. Method of capping a bottle using the capping device (1) according to any one of claims 1 to 14 in which the said capping head (2) screws and crimps a screw cap (8) on the threaded neck (70) of the said bottle or receptacle (7) and in which the said bottle (7) having firstly being brought facing the said head, typically by horizontal step by step displacement, or possibly continuous displacement, of the said bottle (7) and alignment of the said rotation axis (20) and the axis of symmetry (71) and held still for a time T corresponding to one capping cycle, the said head is subjected to a cyclic movement with duration T with respect to the said neck (70) typically including lowering of the said head from a high point to a low point, with a lowering time Td of the said head during which the said cap was firstly procured and placed on the said neck, the said screwing is carried out first during a time Tdv followed by the said crimping for a time Tds, the said lowering time Td being approximately equal to the time necessary to perform the said first and second displacements, followed by a rise time Tr of the said head, the said bottle after being capped being displaced and replaced by another

bottle to be capped typically when the said head is at the said high point.

16. Method according to claim 15 in which the said cyclic movement of the said capping head (2) is a sinusoidal movement typically obtained by cooperation of a connecting rod and a crank.

17. Method according to claim 15 in which the said cyclic movement of the said head (2) is a continuous circular movement typically obtained using a cam.

18. Method according to claim 15 in which the said cyclic movement of the said head is a movement composed of linear parts at constant speed, typically obtained with hydraulic jacks.

19. Method according to claim 18 in which the rise time Tr may be shorter than the lowering time Td, and typically less than half as long.